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EXAMINER	
MALKOWSKI, KENNETH J	
ART UNIT	**PAPER NUMBER**
2613	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/773,945	Applicant(s) SAYYAH, KEYVAN
	Examiner Kenneth J. Malkowski	Art Unit 2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 06 February 2004.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-17,19-21 and 23-27 is/are rejected.

7)☒ Claim(s) 18 and 22 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 06 February 2004 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "optical data receiver comprising an optical comb generator for generating a comb of discrete optical tones," as claimed in claim 11 as well as the "lasers in said at least one receiver segment that are laser diodes," as claimed in claim 15 as well as "data transmitter comprising...(iv) a photodetector for photodetecting the outputs of the array of lasers" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 7 recites the limitation "the data receiving portion" in lines 1-2 of claim 7. There is insufficient antecedent basis for this limitation in the claim.

Claim 14 recites the limitation "the majority of lasers" and "the array of lasers," in lines 1-3 of claim 14. There is insufficient antecedent basis for this limitation in the claim.

4. Claims 11-15 and 23-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. With respect to claims 11-15, independent claim 11 claims an "optical data receiver comprising an optical comb generator for generating a comb of discrete optical tones." However, nowhere in the specification is an optical comb generator comprised within a receiver. Dependent claims 12-15 are also as a result unclear. For instance, in claim 15, an "optical receiver wherein the lasers in said at least one receiver segment are laser diodes," is claimed. However, nowhere in the specification is there taught or shown lasers diodes at an optical data receiver, only photodiodes which sense light as opposed to creating light.

With respect to claims 23-27, independent claim 23 claims "a data transmitter comprising...(iv) a photodetector for photodetecting the outputs of the array of lasers."

However, nowhere in the specification photodetectors comprised within a transmitter. Dependent claims 24-27 are also as a result unclear. For instance, in claim 24, "a data transmitter with an array of bandpass filters" is claimed. . However, nowhere in the specification is there taught or shown filters anywhere in a transmitter.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-5, 7-8, 11-15 and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2005/0018724 to Da Silva in view of U.S. Patent No. 6,545,785 to Heflinger et al. and further in view of U.S. Patent No. 7,139,545 to Drentea et al.

With respect to claim 1, Da Silva et al. discloses an optical data transmitter comprising: (a) an optical comb generator for generating a comb of discrete optical tones (3, Figure 1 (optical frequency comb generator/ master source)); (b) at least one transmitter segment (Figure 1 comprises one segment transmitting from multiplexer 11), said at least one transmitter segment and any additional transmitter segments including at least: (i) an array of lasers (Figure 1, slave laser locking block with lasers marked 5-1 – 5-N), with each laser in the array of lasers in each segment being injection locked to an optical tone in the comb generated by the optical comb generator (page 2 paragraph 13 (slave lasers are locked onto the same output frequency as the master laser

source))(page 3 paragraph 32 (invention uses optical injection phase locked looping to lock the slave lasers to the optical tone in the comb generator)); (ii) a data source providing data for modulating the light generated by a majority of the lasers in the array of lasers in each segment (13, Figure 1 (data bus entering modulators 6-1 – 6-N))(page 3 paragraph 37 (different data is transmitted over each carrier comprising different channels in the WDM source. Modulators are fed by modulating signals from the data bus))(page 2 paragraph 21 (data bus may be in communication with each modulator)). However, Da Silva fails to disclose a frequency shifter for frequency shifting at least one laser in the array of lasers in each segment. Heflinger, from the same field of endeavor discloses an optical communication system (title) with a frequency shifter (16, Figure 1) for frequency shifting a laser (12, Figure 1) to generate a frequency-shifted un-modulated reference signal (24, Figure 1), which occurs in the frequency domain (column 3 lines 61-67 (optical source generates a beam of coherent light at an optical frequency v, which is applied to an optical frequency shifter 16))(beam 24 remains un-modulated by system modulator 50 Figure 1). Therefore, it would have been obvious to one of ordinary skill in the art to multiplex the un-modulated frequency-shifted signal as disclosed by Helfinger with the multiplexed data modulated signals within the system as disclosed by Da Silva. The motivation for doing so would have been to reduce linear distortion (Heflinger: column 1 lines 53-67 (amplitude distortion))(Heflinger: column 2 lines 12-26 (distortion due to phase variation)) and to identify the phase information of the data signal being communicated in a linear manner (columns 2-3 lines 51-67 and 1-15 (provide an output signal that corresponds to the state of optical phase

communication of the communication light beam, the pulse waveform is filtered to create a voltage that linearly corresponds to the state of phase of the communication light beam)).

Furthermore, Da Silva in view of Heflinger fails to disclose at least an additional transmitter segment which is used to create at least two optical paths by combining outputs of modulated lasers, a frequency shifted un-modulated reference signal and the comb of discrete optical tones as Da Silva in view of Helfinger only disclose one transmitter segment. However, It would have been obvious to on having ordinary skill in the art at the time the invention was made to implement multiple transmitter sections in the transmission system as disclosed by Da Silva in view of Helfinger. Since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8.

Heflinger further discloses an optical data receiver (8, Figure 1) comprising: and at least one receiver segment (8, Figure 1), said at least one receiver segment and any additional receiver segments including at least: a photodetector for detecting modulated signals (75, Figure 1 (from modulator 50, Figure 1)); a photodetector for detecting unmodulated signals (60, Figure 1); and a mixer (90, Figure 1) for detecting the modulated signals (86, Figure 1) and the unmodulated signals (72, Figure 1) to recover at least a portion of the data provided by the data source (column 7 lines 40-54 (the voltage at output 94 is plotted as a function of the state of the optical phase radians of the phase modulated communication beam))(column 7 lines 9-21 (combined outputs from unmodulated signal 72 and modulated 76 combine to form the waveform shown in

Figure 2C)). Therefore, it would have been obvious to one of ordinary skill in the art to implement the optical data receiver as disclosed by Heflinger into the optical transmission system as disclosed by Da Silva. Transmission of optical signals from a transmitter to a receiver is notoriously well known in the art. The motivation for including the receiver as taught by Heflinger would have been to receive data signals transmitted by the transmitter as taught by Da Silva for practical uses.

Furthermore Da Silva in view of Heflinger fails to disclose a filter array associated with each photodetector in each segment. Drentea, from the same field of endeavor discloses an ultra-wideband fully synthesized receiver and method (title) wherein the a receiver includes an array of filters (column 5 lines 20-29 (filter bank which can comprise any type of selected filter)) and an array of switches which are an array of MEMS switches (column 5 lines 48-51 (RF switching element may comprise MEMS elements)). Therefore, it would have been obvious to one of ordinary skill in the art to implement a filter array along as taught by Drentea into the first photo-detector to select a desired modulated tone and into the second photo-detector to select a desired un-modulated tone in the receiver as taught by Da Silva in view of Heflinger. The motivation for doing so would have been to accept many more channels (Drentea: abstract (ultra-wideband receiver))(column 9 lines 31-36 (wideband receiver with 20 Ghz range)) without greatly increasing the amount of space needed for the receiver (Drentea: column 3 lines 2-14 (most suitable for receivers with space, size or weight limitations)).

Furthermore, the system as taught by Da Silva in view of Heflinger and further in view of Drentea does not disclose multiple receiver segments. However, It would have been obvious to on having ordinary skill in the art at the time the invention was made to implement multiple receiver sections in the transmission system as disclosed by Da Silva in view of Helfinger. Since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8. Finally, for any transmission system with multiple transmitter/receiver sections it is extremely well known in the art as well as obvious to include some form of multiplexing/de-multiplexing for the motivation of condensing the communication signals and saving on the cost of using multiple communication lines for long distances.

With respect to claims 2-3, Da Silva in view of Heflinger and further in view of Drentea disclose the optical data receiver of claim 11 wherein the filter array in the data receiving portion comprises an array of bandpass filters (Drentea: column 5 lines 20-29 (filter bank which can comprise any type of selected filter)) and an array of switches for selectively enabling the filters (Drentea: column 5 lines 48-51 (RF switching element may comprise MEMS elements)).

With respect to claim 4, Da Silva in view of Heflinger and further in view of Drentea disclose the optical data receiver of claim 11 wherein the light generated by the majority of the lasers in at least one segment is modulated by modulating the majority of the lasers in the array of lasers (Da Silva: 13, Figure 1 (data bus entering modulators 6-1 – 6-N))(Da Silva: page 3 paragraph 37 (different data is transmitted over each carrier

comprising different channels in the WDM source. Modulators are fed by modulating signals from the data bus))(Da Silva: page 2 paragraph 21 (data bus may be in communication with each modulator)).

With respect to claim 5, Da Silva in view of Heflinger and further in view of Drentea disclose the optical data receiver of claim 11 wherein the lasers in said at least one receiver segment are laser diodes (Da Silva: column 1 paragraph 7 (slave laser diode))(Da Silva: Figure 1, 5-1 –5-N)).

With respect to claims 7-8 and 24-25, Da Silva in view of Helfinger disclose the optical data transmitter of claim 6, however fail to disclose an array of bandpass filters and an array of switches wherein the array of switches is an array of MEM switches. Drentea, from the same field of endeavor discloses an ultra-wideband fully synthesized receiver and method (title) wherein the receiver includes an array of filters (column 5 lines 20-29 (filter bank which can comprise any type of selected filter)) and an array of switches which are an array of MEMS switches (column 5 lines 48-51 (RF switching element may comprise MEMS elements)). Therefore, it would have been obvious to one of ordinary skill in the art to implement the switchable filter array as disclosed by Drentea into the optical data transmission system as taught by Da Silva in view of Helfinger. The motivation for doing so would have been to accept a larger amount of traffic volume (Drentea: abstract (ultra-wideband receiver)) in a small and compact receiver (Drentea: column 1 lines 30-40).

With respect to claim 11, Da Silva discloses an optical comb generator for generating a comb of discrete optical tones (3, Figure 1 (optical frequency comb generator/ master source)). However, Da Silva fails to disclose an optical data receiver. Heflinger, from the same field of endeavor discloses an optical data receiver (8, Figure 1) comprising: and at least one receiver segment (8, Figure 1), said at least one receiver segment and any additional receiver segments including at least: a photodetector for detecting modulated signals (75, Figure 1 (from modulator 50, Figure 1)); a photodetector for detecting unmodulated signals (60, Figure 1); and a mixer (90, Figure 1) for detecting the modulated signals (86, Figure 1) and the unmodulated signals (72, Figure 1) to recover at least a portion of the data provided by the data source (column 7 lines 40-54 (the voltage at output 94 is plotted as a function of the state of the optical phase radians of the phase modulated communication beam))(column 7 lines 9-21 (combined outputs from unmodulated signal 72 and modulated 76 combine to form the waveform shown in Figure 2C)). Therefore, it would have been obvious to one of ordinary skill in the art to implement the optical data receiver as disclosed by Heflinger into the optical transmission system as disclosed by Da Silva. Transmission of optical signals from a transmitter to a receiver is notoriously well known in the art. The motivation for including the receiver as taught by Heflinger would have been to receive data signals transmitted by the transmitter as taught by Da Silva for practical uses.

Furthermore Da Silva in view of Heflinger fails to disclose a filter array associated with each photodetector in each segment. Drentea, from the same field of endeavor

discloses an ultra-wideband fully synthesized receiver and method (title) wherein the a receiver includes an array of filters (column 5 lines 20-29 (filter bank which can comprise any type of selected filter)) and an array of switches which are an array of MEMS switches (column 5 lines 48-51 (RF switching element may comprise MEMS elements)). Therefore, it would have been obvious to one of ordinary skill in the art to implement a filter array along as taught by Drentea into the first photo-detector to select a desired modulated tone and into the second photo-detector to select a desired un-modulated tone in the receiver as taught by Da Silva in view of Heflinger. The motivation for doing so would have been to accept many more channels (Drentea: abstract (ultra-wideband receiver))(column 9 lines 31-36 (wideband receiver with 20 Ghz range)) without greatly increasing the amount of space needed for the receiver (Drentea: column 3 lines 2-14 (most suitable for receivers with space, size or weight limitations)).

Furthermore, the system as taught by Da Silva in view of Heflinger and further in view of Drentea does not disclose multiple receiver segments. However, It would have been obvious to on having ordinary skill in the art at the time the invention was made to implement multiple receiver sections in the transmission system as disclosed by Da Silva in view of Helfinger. Since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8. Finally, for any transmission system with multiple transmitter/receiver sections it is extremely well known in the art as well as obvious to include some form of multiplexing/de-multiplexing for the motivation of condensing the

communication signals and saving on the cost of using multiple communication lines for long distances.

With respect to claims 12-13, Da Silva in view of Heflinger and further in view of Drentea disclose the optical data receiver of claim 11 wherein the filter array in the data receiving portion comprises an array of bandpass filters (Drentea: column 5 lines 20-29 (filter bank which can comprise any type of selected filter)) and an array of switches for selectively enabling the filters (Drentea: column 5 lines 48-51 (RF switching element may comprise MEMS elements)).

With respect to claim 14, Da Silva in view of Heflinger and further in view of Drentea disclose the optical data receiver of claim 11 wherein the light generated by the majority of the lasers in at least one segment is modulated by modulating the majority of the lasers in the array of lasers (Da Silva: 13, Figure 1 (data bus entering modulators 6-1 – 6-N))(Da Silva: page 3 paragraph 37 (different data is transmitted over each carrier comprising different channels in the WDM source. Modulators are fed by modulating signals from the data bus))(Da Silva: page 2 paragraph 21 (data bus may be in communication with each modulator)).

With respect to claim 15, Da Silva in view of Heflinger and further in view of Drentea disclose the optical data receiver of claim 11 wherein the lasers in said at least one receiver segment are laser diodes (Da Silva: column 1 paragraph 7 (slave laser diode))(Da Silva: Figure 1, 5-1 –5-N)).

7. Claims 6, 9-10 and 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2005/0018724 to Da Silva in view of U.S. Patent No. 6,545,785 to Heflinger et al.

With respect to claims 6 and 23, Da Silva et al. discloses an optical data transmitter comprising: (a) an optical comb generator for generating a comb of discrete optical tones (3, Figure 1 (optical frequency comb generator/ master source)); (b) at least one transmitter segment (Figure 1 comprises one segment transmitting from multiplexer 11), said at least one transmitter segment and any additional transmitter segments including at least: (i) an array of lasers (Figure 1, slave laser locking block with lasers marked 5-1 – 5-N), with each laser in the array of lasers in each segment being injection locked to an optical tone in the comb generated by the optical comb generator (page 2 paragraph 13 (slave lasers are locked onto the same output frequency as the master laser source))(page 3 paragraph 32 (invention uses optical injection phase locked looping to lock the slave lasers to the optical tone in the comb generator)); (ii) a data source providing data for modulating the light generated by a majority of the lasers in the array of lasers in each segment (13, Figure 1 (data bus entering modulators 6-1 – 6-N))(page 3 paragraph 37 (different data is transmitted over each carrier comprising different channels in the WDM source. Modulators are fed by modulating signals from the data bus))(page 2 paragraph 21 (data bus may be in communication with each modulator)). However, Da Silva fails to disclose a frequency shifter for frequency shifting at least one laser in the array of lasers in each segment. Heflinger, from the same field of endeavor discloses an optical communication system

(title) with a frequency shifter (16, Figure 1) for frequency shifting a laser (12, Figure 1) to generate a frequency-shifted un- modulated reference signal (24, Figure 1), which occurs in the frequency domain (column 3 lines 61-67 (optical source generates a beam of coherent light at an optical frequency v, which is applied to an optical frequency shifter 16))(beam 24 remains un-modulated by system modulator 50 Figure 1). Therefore, it would have been obvious to one of ordinary skill in the art to multiplex the un-modulated frequency-shifted signal as disclosed by Helfinger with the multiplexed data modulated signals within the system as disclosed by Da Silva. The motivation for doing so would have been to reduce linear distortion (Heflinger: column 1 lines 53-67 (amplitude distortion))(Heflinger: column 2 lines 12-26 (distortion due to phase variation)) and to identify the phase information of the data signal being communicated in a linear manner (columns 2-3 lines 51-67 and 1-15 (provide an output signal that corresponds to the state of optical phase communication of the communication light beam, the pulse waveform is filtered to create a voltage that linearly corresponds to the state of phase of the communication light beam)).

Furthermore, Da Silva in view of Heflinger fails to disclose at least an additional transmitter segment which is used to create at least two optical paths by combining outputs of modulated lasers, a frequency shifted un-modulated reference signal and the comb of discrete optical tones as Da Silva in view of Helfinger only disclose one transmitter segment. However, It would have been obvious to on having ordinary skill in the art at the time the invention was made to implement multiple transmitter sections in the transmission system as disclosed by Da Silva in view of Helfinger. Since it has been

held that mere duplication of the essential working parts of a device involves only routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8.

Heflinger further discloses an optical data receiver (8, Figure 1) comprising: and at least one receiver segment (8, Figure 1), said at least one receiver segment and any additional receiver segments including at least: a photodetector for detecting modulated signals (75, Figure 1 (from modulator 50, Figure 1)); a photodetector for detecting unmodulated signals (60, Figure 1); and a mixer (90, Figure 1) for detecting the modulated signals (86, Figure 1) and the unmodulated signals (72, Figure 1) to recover at least a portion of the data provided by the data source (column 7 lines 40-54 (the voltage at output 94 is plotted as a function of the state of the optical phase radians of the phase modulated communication beam))(column 7 lines 9-21 (combined outputs from unmodulated signal 72 and modulated 76 combine to form the waveform shown in Figure 2C)). Therefore, it would have been obvious to one of ordinary skill in the art to implement the optical data receiver as disclosed by Heflinger into the optical transmission system as disclosed by Da Silva. Transmission of optical signals from a transmitter to a receiver is notoriously well known in the art. The motivation for including the receiver as taught by Heflinger would have been to receive data signals transmitted by the transmitter as taught by Da Silva for practical uses.

Furthermore Da Silva in view of Heflinger fails to disclose a filter array associated with each photodetector in each segment. Drentea, from the same field of endeavor discloses an ultra-wideband fully synthesized receiver and method (title) wherein the a receiver includes an array of filters (column 5 lines 20-29 (filter bank which can

comprise any type of selected filter)) and an array of switches which are an array of MEMS switches (column 5 lines 48-51 (RF switching element may comprise MEMS elements)). Therefore, it would have been obvious to one of ordinary skill in the art to implement a filter array along as taught by Drentea into the first photo-detector to select a desired modulated tone and into the second photo-detector to select a desired un-modulated tone in the receiver as taught by Da Silva in view of Heflinger. The motivation for doing so would have been to accept many more channels (Drentea: abstract (ultra-wideband receiver))(column 9 lines 31-36 (wideband receiver with 20 Ghz range)) without greatly increasing the amount of space needed for the receiver (Drentea: column 3 lines 2-14 (most suitable for receivers with space, size or weight limitations)).

Furthermore, the system as taught by Da Silva in view of Heflinger and further in view of Drentea does not disclose multiple receiver segments. However, It would have been obvious to on having ordinary skill in the art at the time the invention was made to implement multiple receiver sections in the transmission system as disclosed by Da Silva in view of Helfinger. Since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8. Finally, for any transmission system with multiple transmitter/receiver sections it is extremely well known in the art as well as obvious to include some form of multiplexing/de-multiplexing for the motivation of condensing the communication signals and saving on the cost of using multiple communication lines for long distances.

With respect to claims 9 and 26, Da Silva in view of Helfinger disclose the optical data transmitter of claim 6 wherein the light generated by the majority of the lasers in at least one segment is modulated by modulating the majority of the lasers in the array of lasers (Da Silva: modulators 6-1 – 6-N modulate the modulate all of the lasers in the segment with the exception of unmodulated sigal added in the Helfinger reference)).

With respect to claims 10 and 27, Da Silva in view of Helfinger disclose the optical data transmitter of claim 6 wherein the lasers in said at least one transmitter segment are laser diodes (Da Silva: column 1 paragraph 7 (slave laser diode))(Da Silva: Figure 1, 5-1 –5-N)).

8. Claims 16-17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2005/0018724 to Da Silva in view of U.S. Patent Application Publication No. 20020075539 to Iida et al.

With respect to claim 16, Da Silva discloses a method of optically modulating and transmitting source data comprising: generating an optical comb comprising optical tones having a frequency spacing equal to Δf (page 4 paragraph 39 (the reference comb generator lines are paced by fRef)); modulating selected ones of the optical tones in the optical comb according to the source data to produce a comb of modulated optical tones (Figure 1, selected optical tones shown at output of transmitter labeled f1 f2 and fN correspond to the modulated tones from modulators 6-1, 6-2 and 6-N); frequency shifting at least one optical tone in the optical comb by a frequency less than Δf to produce a frequency shifted unmodulated optical reference tone (page 1

paragraph 9 (Da Silva teaches it is well known in the art to shift a tone in an optical signaling system by less than Δf (described in Da Silva as fRef) to produce a shifted un-modulated signal fb, (fb>fRef) used for detection at the optical receiver)). However, Da Silva fails to disclose multiplexing the optical comb, the frequency shifted unmodulated optical reference tone and the comb of modulated tones onto at least one optical path. Despite this, multiplexing a reference tone with a data tone from a transmitter onto at least one optical path is well known in the art. Iida, from the same field of endeavor discloses a WDM transmitter and receiver (title) wherein the WDM transmitter multiplexes a reference frequency signal and optical signal wavelength bands onto a single optical path (20, Figure 6)(page 2 paragraph 29) further wherein the reference frequency signal is frequency shifted via a frequency converter (page 9 paragraph 210 (reference frequency is frequency signal is shifted by frequency conversion portion 137)). Therefore, it would have been obvious to one of ordinary skill in the art to implement the system and method of multiplexing of a reference signal and data signals onto a single optical path as taught by Iida in the optical transmission system as taught by Da Silva. The motivation for doing so would have been that sending a reference frequency on the sending side to the receiver with the data signals improves the accuracy of the frequency shift and also, the change of the reference frequency on the sending side is detected in real time on the receiving side, thereby allowing an accurate shift of frequency to be performed. Furthermore, multiplexing the reference frequency with the data signals rather than simply including a reference frequency generator at the

receiver side reduces receiver side complexity and cost and eliminates the need for duplicate reference frequency generators.

With respect to claim 17, Da Silva in view of Iida disclose the method of claim 16 wherein the optical tones are generated by an optical comb generator (Da Silva: 3, Figure 1 (optical frequency comb generator/ master source)) has a segment of optical tones (Da Silva: 3A: Figure 1 reference comb)(Da Silva: 11A, Figure 1 referenced optical channels) having a frequency shifted un-modulated optical reference tone (Iida: page 9 paragraph 210 (reference frequency is frequency signal is shifted by frequency conversion portion 137)) (page 1 paragraph 9 (Da Silva teaches it is well known in the art to shift a tone in an optical signaling system by less than Δf (described in Da Silva as fRef) to produce a shifted un-modulated signal fb, (fb>fRef) used for detection at the optical receiver)) and a plurality of modulated tones (11A, Figure 1 referenced optical channels), the tones of each segment being multiplexed by a segment multiplexer associated with a segment (Iida: page 2 paragraph 23 (optical multiplexing means of multiplexing each of said optical signals))(11, Figure 1). However, Da Silva in view of Iida do not disclose multiple segments. However, It would have been obvious to on having ordinary skill in the art at the time the invention was made to implement multiple segments in the transmission system as disclosed by Da Silva in view of Iida. Since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8.

With respect to claim 19, Da Silva in view of Iida disclose the method of claim 16 wherein the of modulating selected ones of the optical tones in the optical comb is

accomplished by modulating (Da Silva: via the modulators 6-1 –6-N at the output of each laser in Figure 1) an output of each laser in a set of lasers (Da Silva: Figure 1 5-1 – 5-N)) which are optically injection-locked to different optical tones in the optical comb ((page 2 paragraph 13 (slave lasers are locked onto the same output frequency as the master laser source))(page 3 paragraph 32 (invention uses optical injection phase locked looping to lock the slave lasers to the optical tone in the comb generator)).

9. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2005/0018724 to Da Silva in view of U.S. Patent Application Publication No. 20020075539 to Iida et al. and further in view of U.S. Patent No. 6,487,329 to Foltzer et al.

With respect to claim 20, Da Silva in view of Iida disclose the method of claim 19, however Da Silva in view of Iida fail to disclose wherein the output of each laser in a set of lasers is modulated by direct intensity modulation of each laser. Despite this, direct intensity modulation of lasers is well known in the art in general and it is also well known in transmission systems that use optical comb generation techniques in combination with direct intensity laser modulation. Foltzer, from the same field of endeavor discloses a WDM communication system (column 1 lines 8-11) wherein optical sources utilize an optical comb generator (column 2 lines 44-47) and further wherein copies of the comb are distributed to individual intensity modulators which impress information onto each of the carriers (column 2 lines 45-52). It is well known that forms of modulation are interchangeable, each with their own advantages and disadvantages. It is further well known that choosing any given type of modulation is a matter of simple design choice

given that modulation formats such as phase modulation and amplitude or frequency modulation are so well known in the art.

With respect to claim 21, Da Silva in view of Iida disclose optically modulating and transmitting according to the method of claim 16, as well as a method of receiving comprising optically de-multiplexing (Iida: the multiplexed optical comb (Iida: Figure 6 at WDM optical receiver 205), the frequency shifted unmodulated optical reference tone (page 1 paragraph 9 (Da Silva teaches it is well known in the art to shift a tone in an optical signaling system by less than Δf (described in Da Silva as fRef) to produce a shifted un-modulated signal fb, (fb>fRef) used for detection at the optical receiver)) (Iida: page 9 paragraph 210 (reference frequency is frequency signal is shifted by frequency conversion portion 137)) and the comb of modulated tones (Da Silva: 11A Figure 1) in at least one demultiplexer (130, Fgiure 6) however fail to disclose a method of receiving and demodulating source data with a pair of photodiodes. Heflinger, from the same field of endeavor discloses an optical data receiver (8, Figure 1) comprising: and at least one receiver segment (8, Figure 1), said at least one receiver segment and any additional receiver segments including at least: a photodetector for detecting modulated signals (75, Figure 1 (from modulator 50, Figure 1)); a photodetector for detecting unmodulated signals (60, Figure 1); and a mixer (90, Figure 1) for detecting the modulated signals (86, Figure 1) and the unmodulated signals (72, Figure 1) to recover at least a portion of the data provided by the data source (column 7 lines 40-54 (the voltage at output 94 is plotted as a function of the state of the optical phase radians of the phase modulated communication beam))(column 7 lines 9-21 (combined outputs from unmodulated signal

72 and modulated 76 combine to form the waveform shown in Figure 2C)). Heflinger further discloses filtering the mixing outputs of the first and second photo-detectors (92, Figure 4)(column 7 lines 39-41 (low pass filter 92)). Therefore, it would have been obvious to one of ordinary skill in the art to implement the optical data receiver as disclosed by Heflinger into the optical transmission system as disclosed by Da Silva in view of Iida. The motivation for doing so would have been to have an optical receiver with increased sensitivity through reduced linear distortion (Heflinger: column 2 lines 30-35).

Allowable Subject Matter

10. Claims 18 and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to further show the state of the art with respect to WDM transmission and reception general:

U.S. Patent No. 6,965,739 is cited to show combining reference signals and data signals at a base transmitter segment and sending said multiplexed signals to multiple receivers with antenna transmitters

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth J. Malkowski whose telephone number is (571) 272-5505. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KJM 1/9/07

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER